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REVIEW

Empowering Self-Management in Prostate Cancer: A Scoping Review of Mobile Health Interventions

Lu Man[1–3,*], Yuyi Luo[1–3,*], Guolong Chen[1–3,*], Shuhong Chen[1–3], Man Xu[1–3], Huiming Lu[1–3], Xiaoping Chen[1–3]

[1]Department of Urology, Sun Yat-sen University Cancer Center, Guangzhou, People's Republic of China; [2]State Key Laboratory of Oncology in South China, Guangzhou, People's Republic of China; [3]Guangdong Provincial Clinical Research Center for Cancer, Guangzhou, People's Republic of China

*These authors contributed equally to this work

Correspondence: Xiaoping Chen; Huiming Lu, Sun Yat-sen University Cancer Center, Dongfeng East Road 651, Guangzhou, 510060, People's Republic of China, Email chenxp@sysucc.org.cn; luhm@sysucc.org.cn

Purpose: This scoping review aimed to explore the application of mobile health (mHealth) in prostate cancer (PC) care, focusing on how these interventions have been applied to promote self-management and patient empowerment.

Methods: A comprehensive search was performed across multiple databases, including CNKI, PubMed, Embase, Web of Science, and Cochrane Library. Studies were included if they involved mHealth interventions for prostate cancer patients and assessed self-management or empowerment outcomes. Data were extracted from randomized controlled trials, quasi-experimental studies, and mixed-methods studies.

Results: Among the 30 studies included, mHealth interventions were reported to support improvements in self-management and patient empowerment. Interventions ranged from remote monitoring systems and mobile apps to social media platforms, with generally high feasibility and patient satisfaction. However, the evidence remains heterogeneous, and challenges persist regarding data privacy, platform customization for older adults, and integration of theoretical frameworks.

Conclusion: mHealth interventions show promise in enhancing prostate cancer management by supporting patient empowerment and self-management. Nevertheless, evidence is still limited, and future research should prioritize personalized approaches and address privacy concerns to better establish their role and optimize impact.

Keywords: mobile health, prostate cancer, self-management, patient empowerment

Introduction

Prostate cancer (PC) is one of the most common malignancies affecting men globally, with particularly high incidence rates in the aging populations.[1] As advancements in diagnosis and treatment improve survival outcomes, more PC survivors face challenges related to managing long-term treatment side effects and maintaining their quality of life.[2] Patients often experience urinary incontinence, erectile dysfunction, fatigue, and psychological distress. As a result, the need for effective self-management strategies and patient empowerment has become increasingly critical.[3]

Self-management enables PC patients to actively monitor and manage their symptoms, adjust their daily activities, and make informed health decisions.[4] In contrast, patient empowerment equips individuals with the knowledge, skills, and confidence to participate in care decisions.[5] Together, these approaches improve health outcomes and enhance the quality of life. However, despite their recognized importance, many patients with PC struggle to access adequate resources and support effective implementation. Limited access to healthcare, disparities in educational resources, and the emotional toll of cancer often hinder successful self-management adoption.

In recent years, mobile health (mHealth) technologies have emerged as powerful tools for addressing self-management and patient empowerment across healthcare domains.[6] mHealth solutions, including smartphone apps and remote monitoring devices, have shown considerable success in helping patients manage chronic conditions, providing

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real-time feedback, and facilitating communication with healthcare providers. These innovations have been particularly effective in managing conditions, such as diabetes, cardiovascular diseases, and mental health, where patient engagement and continuous health tracking are critical.[7]

Given the complex and ongoing needs of prostate cancer survivors, mHealth has considerable potential to address their unique self-management challenges. By offering accessible platforms for health monitoring, personalized feedback, and educational resources, mHealth can empower patients to take control of their care. Additionally, mHealth has the potential to reduce the burden on healthcare systems by minimizing unnecessary hospital visits and improving follow-up care efficiency.[8] This innovation offers a promising solution to the pressing issue of empowering patients with PC to navigate their post-treatment lives with confidence and independence.

Despite its potential, the current landscape of mHealth interventions for PC patients remains fragmented. Systematic evaluation of the content, platforms, and effectiveness of these interventions in empowering patients and promoting self-management is lacking. This scoping review, using Arksey and O'Malley's framework, aimed to explore the application of mHealth in PC care. By synthesizing existing research, this review provides insights into how mHealth can be optimized to support patient education, enhance self-management, and improve adaptation to illness in this population. The findings aim to inform future nursing interventions and contribute to the development of personalized strategies for managing chronic conditions such as PC.

Methods

Design

Arksey and O'Malley's scoping review method were selected for its ability to facilitate a knowledge synthesis that addresses an exploratory research question. This approach enables researchers to map conceptual frameworks, examine various types of evidence, and identify gaps in a specific research domain. This scoping review was conducted in five steps as described below. The PRISMA Checklist was used to guide the writing of this manuscript.

Research Question

The following research question was formulated: what types of mhealth applications are used to support self-management in patients with PC? What is the content of mhealth interventions aimed at improving self-care and disease management for patients with PC? What are the effects of mhealth interventions on patients with PC, particularly in terms of self-management and empowerment?

Search Strategy

Articles included in this study were retrieved from multiple databases, including CNKI, Wanfang, PubMed, Embase, Web of Science, and the Cochrane Library. The search terms used were combinations of "mobile health" OR "mHealth" AND "prostate cancer" OR "prostatic neoplasm." The search covered all relevant literature up to March 1, 2024.

Inclusion and Exclusion Criteria

The following inclusion criteria were established based on the research questions:

(1) Inclusion criteria: The study population comprised PC patients. The intervention was delivered through a mHealth platform, including mobile applications, portals, and web platforms, with no restrictions on intervention duration or frequency. Outcome measures focused on the effects of mHealth interventions on prostate cancer patients, including physiological indicators, psychological outcomes, self-management, and patient empowerment. The study types included randomized controlled trials, quasi-experimental studies, and mixed-methods studies. (2) Exclusion criteria: study protocols, guidelines, and consensus statements. Non-English and non-Chinese literature. Studies or conference papers without full-text availability. Duplicate publications.

Data Selection and Extraction

All retrieved articles were imported into Endnote X9 for reference management, and duplicate records were identified and removed. To minimize selection bias, two researchers trained in evidence-based practice independently screened titles and abstracts according to the inclusion and exclusion criteria. Any discrepancies between the two reviewers were resolved through discussion with a third researcher, ensuring a consensus on the final set of studies to be included. For data extraction and synthesis, two researchers independently extracted data from the included studies. For randomized controlled trials and quasi-experimental studies, the extracted data included study author, publication year, country, study design, sample size, intervention duration, content and format of the mHealth intervention, delivery platform, theoretical framework, and outcome measures. For mixed-methods studies, both quantitative and qualitative data were extracted and analyzed accordingly.

Results

Study Selection and Characteristics

The initial search yielded 984 studies in both English and Chinese languages. After removing 201 duplicates, 783 articles remained. During title and abstract screening, 694 articles were excluded because they did not meet the inclusion criteria. The full texts of the remaining 89 articles were assessed, leading to the exclusion of 19 studies due to irrelevant topics, 23 studies due to mismatched populations, 12 studies due to inappropriate study designs, and 5 studies due to unavailability of full text. Ultimately, 30 studies were included in the final review (Figure 1).

The 30 included studies originated from 11 different countries, with the largest number from the United States (n=9), followed by China (n=6), Australia (n=3), South Korea (n=2), the United Kingdom (n=2), Canada (n=1), the Netherlands (n=1), Japan (n=1), Norway (n=1) and Turkey (n=1). The number of publications ranged from 2012 to 2024. The study designs included randomized controlled trials (n=14), quasi-experimental studies (n=9), and mixed-methods studies (n=7), with sample sizes ranging from 13 to 431 participants. The key characteristics of the included studies are summarized in Table 1.

mHealth Platforms and Interventions in PC Management

The reviewed studies utilized various mHealth platforms to support PC management, including remote monitoring systems, mobile applications, Internet-based platforms, and social media.

Remote monitoring systems were used in three studies,[19,25,39] which allowed healthcare providers to track vital signs, symptoms, and physical activity in real-time. Systems such as ActiLife enable the timely detection of health changes, triggering alerts for appropriate interventions.[19]

Internet-based platforms such as LifeGuide and Pack Health were discussed in six studies,[15,26,32,37,40,41] providing patients with educational resources and fostering interactions between them and healthcare professionals. These platforms enhance patient engagement and offer personalized guidance for managing symptoms, physical activity, and pain.

Mobile applications (apps) featured in eight studies,[9,21,24,30,36,39,42,43] serving as tools for symptom reporting, health education, and exercise management. Apps such as KakaoTalk[9] and Interaktor[39] empower patients to monitor their health, report symptoms, and receive timely feedback from healthcare providers.

In six studies, professional websites were used to deliver comprehensive information on PC, including prevention, screening, and treatment options.[14,27,28,35,38,44] These websites provide patients with access to videos and educational materials designed to address common issues related to PC management.

Finally, social media platforms like WeChat and QQ were utilized in four studies to create online communities where patients could interact, share experiences, and receive social support.[28,45–48] These platforms also facilitate health guidance and personalized care plans, thereby enhancing patient involvement in their care.

Content and Focus of mHealth Interventions

mHealth interventions in prostate cancer management addressed several key areas: health education, disease monitoring, social support, and physical exercise.

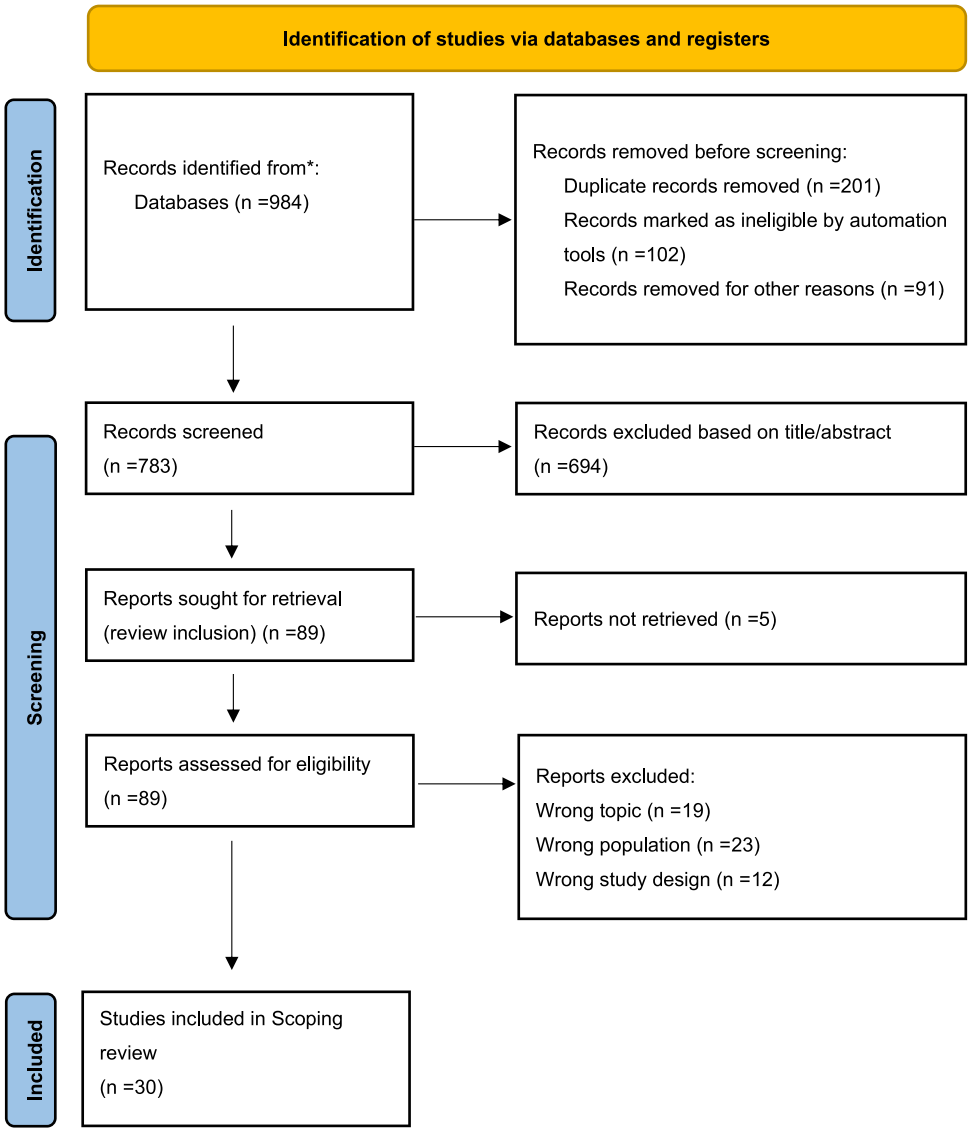

Figure 1 PRISMA-ScR Flow Diagram.
Notes: *Records were identified from multiple databases (PubMed, Embase, Web of Science, Cochrane Library, CNKI, Wanfang). No automation tools were used.

Health education was a central component in 24 studies, with mHealth platforms delivering content on disease management, nutrition, and exercise in text, video, and interactive formats. Educational content is often curated by healthcare professionals and delivered through mobile applications, websites, and cloud platforms.

Disease monitoring was emphasized in 10 studies, where platforms enabled the real-time tracking of vital signs, physical activity, and urinary symptoms. Wearable devices and remote monitoring systems facilitate the collection and analysis of patient data, with healthcare providers offering personalized feedback based on the results.

In 17 studies, mHealth platforms provided social support by fostering communication among patients, family members, and healthcare providers. Through webinars, forums, and social media, patients can share experiences and receive emotional support from peers and healthcare professionals.

Finally, 12 studies focused on physical exercise and functional training, with mHealth platforms offering personalized exercise plans, instructional videos, and feedback regarding exercise performance. These interventions were designed to help patients maintain physical activity and improve pelvic floor strength.

Table 1 Studies Included in the Scoping Review

Author(s), Years	Country	Study Participants		Intervention Measures	Duration of Intervention
		Sample Size (I/C cases)	Age (years, $\bar{x} \pm s$)		
Lee-2024[9]	South Korea	22/24	68.83±7.09	Nurses delivered one-on-one health coaching through Zoom meetings and the KakaoTalk messaging app. Empowerment interventions were offered via Email and Zoom meetings, while remote monitoring was facilitated by the HeartMath sensor.	4 weeks
Lawen-2024[10]	Canada	66/62	66	Empowerment interventions were delivered via Email and Zoom meetings, with remote monitoring facilitated by the HeartMath sensor.	6 months
Haiyan Chen-2023[11]	China	49/56	46.5±7.23 / 46.91±8.12	Multidisciplinary team-based continuity care was delivered through WeChat and other online platforms.	3 months
Camilla-2023[12]	Sweden	74/72	64±6.23	Digital self-management services were accessed via online platforms or mobile apps.	12 months
Qianlan Zhang-2023[13]	China	44/44	56.49±5.38	Continuity home care was delivered via an "Internet+ healthcare" information platform.	-
Marziliano-2022[14]	United States	217/214	63.79±6.67	Health education was delivered via the PROGRES informational website for prostate cancer patients.	6 months
Handley-2022[15]	United States	63	68.9±7.8	Health coaching was delivered via the Pack Health digital platform.	12 weeks
Goode-2022[16]	United States	101/94	62±7.8	Telemedicine was utilized for training pelvic floor and abdominal muscles.	12 months
Xiying Wu-2022[17]	China	30/30	66.72±2.84 / 67.08±3.03	Continuity care was delivered via the WeChat platform.	30 weeks
Qingqun Jiang-2022[18]	China	40/40	68.53±5.97 / 68.93±5.85	Health coaching and follow-up were delivered to patients via the cloud-based follow-up system.	6 months
Vande Wiel-2021[19]	Netherlands	45/46	59.3±11.3 / 59.2±14.4	An internet-based physical activity support program and ActiLife software were utilized for exercise monitoring.	6 months
Sundberg-2021[20]	Sweden	66/64	69	The Interaktor mobile health application was utilized for symptom reporting and self-care support.	3 months
Song-2021[21]	United States	31/31	63.59±7.74 / 68.93±5.85	Interaction was facilitated via a web-based mobile health program.	15 weeks
Evans-2021[22]	Australia	20/20	70.2± 8.5	Personalized exercise interventions were delivered via a website and telephone-based program.	8 weeks
Yan Sha-2020[23]	China	34/34	66.7±5.4 / 67.3±5.2	Health coaching was delivered via online platforms like WeChat and QQ groups.	3 months
Tran-2020[24]	United States	30	55	Patients utilized the Strength Through Insight application to self-report outcomes.	12 weeks
Sato-2020[25]	Japan	30	62.7±4.1	Patients utilized a tablet to access the remote care support system for self-management and prevention of postoperative complications.	3 months
Hughes-2020[26]	United Kingdom	10/3	66.3±7.34	Self-management information was delivered via the web-based LifeGuide platform.	6 weeks
Finlay-2020[27]	Australia	27/17	66.6±9.66	A specific exercise intervention program was customized via the PCHF online website.	4 weeks
Chan-2020[28]	United States	38/40	70	Behavioral support was delivered via the Health Community Portal website.	3 months
Huiting Chen-2019[29]	China	106/106	55.04±5.03 / 54.72±4.66	The health education group delivered health education and online consultations via the WeChat platform.	-

(*Continued*)

Table 1 (Continued).

Author(s), Years	Country	Study Participants		Intervention Measures	Duration of Intervention
		Sample Size (I/C cases)	Age (years, $\bar{x} \pm s$)		
Lee-2019[30]	South Korea	38/43	69.06±7.21 / 69.82±7.73	The Smart After-Care smartphone application and the InbodyBand wearable digital pedometer were utilized for exercise intervention.	12 weeks
Kenfield-2018[31]	United States	37/39	66	Personalized recommendations and exercise guidance were delivered via a website and remote monitoring system.	12 weeks
Cockle-2018[32]	United Kingdom	8/10	69±6.1	An online self-management system and peer support films were utilized to assist with self-management.	4 weeks
Wengström-2017[33]	Sweden	66/64	69±5.8 /69±6.2	Self-care was facilitated via a mobile application.	3 months
Chambers-2017[34]	Australia	94/95	70.19±8.71	Mindfulness-based cognitive therapy was provided through internet-based remote meetings.	8 weeks
Song-2015[35]	United States	26	62.95±8.22	Family-participatory symptom management was facilitated via the PERC website.	8 weeks
Ruland-2013[36]	Norway	66/70	56.9±10.7	The WebChoice interactive health communication application, an internet support system, was utilized to help cancer patients alleviate symptom distress.	3 months
Diefenbach-2012[37]	United States	32/19	61.93±8.08	The internet-based multimedia Prostate Interactive Education System (PIES) was utilized to enhance patients' treatment decision-making.	-
Capık-2012[38]	Turkey	73	49.1±3.7	Educational sessions were delivered in 60–70 minute single-class formats via online-assisted education to improve prostate cancer patients' health knowledge, beliefs, and self-monitoring behaviors.	6 months

Outcomes of mHealth Interventions in PC Patients

The outcomes of mHealth interventions in patients with PC were primarily assessed in four key domains: health outcomes, quality of life, health behaviors, and patient experiences.

Health outcomes were evaluated in 21 studies, focusing on indicators, such as vital signs, fasting blood glucose, waist circumference, triglyceride levels, and high-density lipoprotein cholesterol. Monitoring lower urinary tract symptoms, particularly urinary incontinence, was a common outcome in six studies. Additionally, seven studies assessed psychological health outcomes, including symptom distress, anxiety, depression, and post-traumatic growth, highlighting the holistic impact of mHealth interventions on both physical and mental health.[34]

Quality of life was a major focus of 16 studies that utilized various validated instruments to measure changes in patients' well-being. Tools such as the European Organization for Research and Treatment of Cancer Quality of Life Questionnaire (EORTC QLQ-C30), Functional Assessment of Cancer Therapy-General (FACT-G), Expanded PC Index Composite (EPIC-CP), Incontinence Quality of Life Questionnaire (I-QOL, Chinese version), and Short Form Health Survey (SF-36) are commonly employed. These studies demonstrated that mHealth interventions contributed to improvements in the overall quality of life by facilitating better management of symptoms and enhancing patients' ability to navigate the challenges associated with PC.[16]

In terms of health behaviors, ten studies explored how mHealth interventions influenced patients' lifestyle choices and treatment adherence. Changes in dietary habits, exercise routines, and pelvic floor muscle training frequency have been commonly reported, along with increases in physical activity levels.[10] These behavioral modifications were closely tied to the interventions' focus on self-management, helping patients take a more active role in their healthcare.[31]

Finally, patient experiences with mHealth platforms were assessed in 13 studies that examined aspects such as satisfaction, feasibility, usability, and safety. Feedback was gathered through a combination of platform usage data, retention rates, and self-reported measures of website visits. Additionally, qualitative interviews were conducted to explore patients' perceptions of the barriers and facilitators of adopting mHealth tools. These studies underscored the importance of user-friendly interfaces and personalized features in ensuring positive patient experiences and sustained engagement with mHealth platforms.

Discussion

Effectiveness of mHealth in Enhancing Self-Management and Empowerment in PC Care

This scoping review underscores the potential role of mHealth interventions in managing PC and reports generally high feasibility and patient satisfaction, though evidence remains heterogeneous. These interventions are considered helpful for improving self-management by allowing patients to monitor symptoms, manage treatment side effects, and actively engage in decision-making regarding their care.[42] The personalized education and support provided through mHealth platforms empower patients, which has been associated with improved patient engagement and a greater sense of control, though causal effects cannot be inferred.[15]

Notably, the World Health Organization (WHO) recognizes mHealth as a key solution for overcoming the limitations of traditional healthcare, particularly by enhancing accessibility and reducing costs. Platforms, such as WeChat, have gained prominence in real-time health monitoring, offering potential advantages by integrating remote monitoring systems with automated data uploads. This integration allows healthcare providers to deliver timely, personalized interventions based on real-time data, which may improve care quality and support patients' ability to manage their health.[48]

Challenges and Opportunities for Fostering Self-Management and Empowerment Through mHealth in PC Patients

Research has expanded significantly since the of mHealth interventions for PC in 2012. However, several challenges remain, particularly in fostering self-management and patient empowerment. Of the 30 studies reviewed, only 13 employed a clear theoretical framework, with most focusing on behavioral change rather than self-management and

empowerment.[19,27,44] These concepts are vital for chronic disease management as they encourage patients to actively engage in their care. Future research should prioritize the integration of self-management and empowerment theories to create more holistic and impactful mHealth interventions.

Many of the interventions reviewed are limited in scope, focusing on health education, symptom monitoring, and social support. While valuable, the standardization of these interventions may neglect the unique and evolving needs of patients with PC, particularly older adults who often require more personalized support. Customizing mHealth platforms to consider patients' diverse health profiles, preferences, and life stages can significantly enhance their relevance and usability.[49] Tailored interventions that adapt to patient feedback promote both self-management and patient engagement in health care.

Data privacy and security concerns remain significant barriers to mHealth adoption. Given the sensitive nature of health information, it is critical to ensure robust data protection. To build trust and encourage patients to use these tools confidently, it is essential to address these concerns by implementing strict security protocols, clear privacy policies, and transparent consent procedures. When patients feel secure sharing their health data, they are more likely to engage with mHealth interventions, improving the chances of successful self-management and empowerment outcomes.[50]

Future Directions for Strengthening Self-Management and Empowerment in mHealth for PC Patients

The integration of mHealth into PC management presents a unique opportunity for enhancing patient engagement, promoting self-management, and fostering empowerment. To maximize the impact of these interventions, several key areas require further attention.

First, while platforms such as WeChat are widely used, they often lack the specificity required for managing PC. Future interventions should be tailored to local healthcare environments and patient populations to meet the unique needs of patients with PC across different regions. Localizing these platforms will not only increase the relevance and cultural fit of mHealth interventions, but also deepen patient engagement, making the tools more meaningful and accessible to diverse populations.[51]

Second, PC predominantly affects older men; however, many mHealth platforms are not optimized for this demographic. To promote effective self-management and empowerment, mHealth interventions should be adapted for older adults. This includes simplifying user interfaces, improving content readability, and tailoring health information to the cognitive and physical capabilities of elderly patients.[52] Making these platforms more accessible will help bridge the digital divide, encourage greater use among older patients with PC, and enhance their ability to manage their health independently.

Third, the success of mHealth interventions depends on the privacy and security of patient data. Strengthened regulatory frameworks, along with clear and accessible privacy policies, are essential for addressing growing concerns about data security.[50] Patients must feel confident that their personal information is protected. This requires transparent communication about how data will be collected, stored, and shared and the implementation of robust security measures. Building trust in data protection is critical to empowering patients to engage with mHealth tools.

Finally, the rapid evolution of digital technologies presents new opportunities for enhancing mHealth interventions.[53] Integrating advanced technologies such as artificial intelligence (AI), machine learning, and big data analytics can improve the personalization of mHealth platforms, providing real-time feedback and support tailored to individual patient needs. Future research should explore the potential of these technologies to enhance the scalability and sustainability of mHealth interventions, particularly in supporting long-term self-management and empowerment of PC patients.

Limitations

This study had several limitations. First, the studies varied in intervention design, making direct comparison challenging. Second, a significant portion of the research lacks a clear theoretical foundation, limiting the understanding of the mechanisms behind self-management and empowerment. Additionally, most studies have focused on short-term outcomes, highlighting the need for long-term data to assess the sustained impact of mHealth interventions on PC

management. Finally, inclusion of only English and Chinese studies may have excluded relevant findings from other regions.

Conclusion

This scoping review highlights the potential of mHealth interventions to support PC patients and facilitate their self-management. These interventions encompass diverse and rich practical applications, spanning critical areas such as disease monitoring, treatment support, and rehabilitation guidance. For instance, several studies reported positive outcomes in specific applications like improving urinary incontinence symptoms and enhancing quality of life. Despite the challenges related to privacy, customization, and theoretical application, these tools offer a promising approach for bridging the gap between patients and healthcare providers. Future research should focus on improving the personalization, security, and scalability of these interventions to better establish their role in diverse patient populations. Ultimately, mHealth can play a supportive role in transforming PC care by helping patients manage their health and encouraging long-term engagement with treatment.

Abbreviations

mHealth, Mobile Health; PC, Prostate Cancer; EORTC QLQ-C30, European Organization for Research and Treatment of Cancer Quality of Life Questionnaire; FACT-G, Functional Assessment of Cancer Therapy-General; EPIC-CP, Expanded Prostate Cancer Index Composite; I-QOL, Incontinence Quality of Life Questionnaire; SF-36, Short Form Health Survey; TNPM, Tele-Nurse Practice Model; C-SHIP, Cognitive-Social Health Information Processing.

Data Sharing Statement

All data are available from the corresponding authors upon reasonable request.

Ethics Approval

Ethics declaration is not required in the study.

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Disclosure

The authors report no conflicts of interest in this work.

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